Educational Reforms and Career Choice in Agriculture: Implications for Workforce Development in Ghana

Prosper Kwesi Doamekpor
Department of Agricultural and Extension Education
The Pennsylvania State University
University Park, PA 16803
Phone: 814-865-6551
Fax: 814-863-4753
e-mail: pkd117@psu.edu

Connie D. Baggett
Ahmed K. Banya
The Pennsylvania State University

William Amexo
The West African Examinations Council
Accra, Ghana

Abstract
Educational reforms in Ghana were part of the Economic Recovery Program undertaken to restore the country’s old system of education and raise the hopes of the Ghanaian citizenry after a long economic decline. Among the reasons for the reforms were to improve teaching and learning efficiency and effectiveness by increasing school hours and the quality of teachers, including the phasing out untrained teachers, and to make education more relevant by increasing the attention paid to problem solving, environmental concerns, prevocational training, manual dexterity, and general skills training. This paper explores some achievements made with regards to senior secondary school education enrollments in agricultural science. A review of some problems that were encountered prior to the nationwide implementation of the reforms is discussed.

This study employs a mixed methods design. Primary and secondary data were used to analyze trends in the enrollment of final year candidates in agricultural science for the period (1999 – 2006). The findings of the trend analysis of final year agricultural science school candidates for the senior secondary school certificate examinations (SSSCE) are reported. These preliminary results were complemented with qualitative data from key informants in the education sector as a follow-up. Results indicate low enrollment of students in forestry and fisheries. Currently, only one secondary school offers fisheries and two secondary schools offer forestry in Ghana. It is speculated that there are no job prospects for students enrolled in these subjects. Further inquiries to ascertain the lack of interest in these subjects are underway.

Keywords: Workforce development, vocationalism, vocationalization, educational reforms
**Introduction**

Formal education in Ghana dates back to the mercantile era preceding colonization when the first schools were set up by the European merchants and missionaries (Graham, 1971). A formal state education structure, modeled on the British system, was set up during the colonial period. The Education Act of 1961 established the policy of free and compulsory primary and basic education for all children of school-going age in Ghana.

In 1983, the Government enacted Provisional National Defense Council (PNDC) Law 42 to modify and reinforce among others, the Education Act of 1961. Wide-ranging reforms in the late 1980s brought the educational structure closer to the American model, aiming to make education more responsive to the nation’s economic needs. Among the shortcomings of the old system of education was the 17-year-long pre-tertiary education which was found to be not only time-consuming, but also limited in scope, unproductive, and expensive to both the government and parents. Furthermore, while access was limited, the content overemphasized “grammar-type education” and academic achievements. As a result, students who could not cope with academic work dropped out of school. These dropouts had to seek alternate forms of training in either apprenticeship (Palmer, 2005) or petty trading to curb the high unemployment rate.

Some major problems Ghana encountered prior to the Education Reforms of 1987 were:

1. Falling education standards due to exodus of trained and qualified teachers from the country as a result of the economic decline in the 1970s;
2. Lack of textbooks and stationery items as a result of foreign exchange;
3. Deterioration of buildings, furniture and equipment resulting in the collapse of school management;
4. Cutting back on levels of funding of the educational sector by successive governments. According to the World Bank (2004), prolonged economic decline prior to the introduction of reforms had led to a compression of educational expenditure from 6.4 percent of GDP in 1976 to just 1.5 percent by 1983 and 1.7 percent in 1985. This spending was skewed in two ways: (i) large subsidies to secondary and tertiary levels, meaning that only one-third of education expenditure went to the primary sector, and (ii) recurrent expenditure was almost entirely absorbed by wages of teaching and non teaching staff, a problem exacerbated by the large number of “ghost workers” (World Bank, 2004, p. 7).
5. Non-availability of data and statistics for strategic planning which led to decisions being taken on ad-hoc basis (Ministry of Education, 1996).

Between independence in 1957 and the mid-1980s, there were nine attempts at educational reforms, starting with the Botsio Commission in 1960. Most important was the 1972 Dzobo Commission whose report, “The New Structure and Content of Education,” formed the basis for the 1987 reforms. The Dzobo Commission recommended that middle schools be replaced by Junior Secondary Schools (JSS), with a stronger vocational orientation. Even though there were a series of oppositions from the middle class and the teaching profession, including the Ghana Education Service, the reforms were implemented nationwide under the government of the Provisional National Defense Council.

Prior to the nationwide implementation of the reforms, 118 junior secondary schools experimented with the concept in 1974. The reform objectives sought to:
Expand and make access more equitable at all levels of education.

Change the structure of the school system, by replacing the 6-4-7 system with 6-3-3, reducing the length of pre-university education from 17 to 12 years. Middle schools were to be replaced by junior secondary schools (JSSs), which would be an integral part of the system for all children, and ordinary and advanced level certificate examinations replaced with the senior secondary school certificate examinations.

Improve teaching and learning efficiency and effectiveness by increasing school hours and the quality of teachers, including the phasing out untrained teachers (i.e. those with no formal teaching qualification, often referred to as “pupil teachers”).

Make education more relevant by increasing the attention paid to problem solving, environmental concerns, prevocational training, manual dexterity and general skills training.

Contain and partially recover cost (through programs to increase cost recovery at the secondary and tertiary levels).

Make educational planning and management more efficient and effective.

The current educational system (See Table 1) comprises six years of primary school, three years of junior secondary school followed by three years of senior secondary school (SSS). This constitutes twelve years of pre-tertiary education. Tertiary education consists of four years of university education or three to four years of training at the polytechnics teacher training colleges and other training institutions in the field of agriculture and health.

The reform was implemented with the hopes to increase access to education at all levels, improve quality of teaching and learning, and to increase the relevance of education to the labor market by emphasizing technical and vocational skills acquisition (Djangmah, 1998; Akyeampong, 2005). Many new primary, junior, and senior secondary schools have been established since the reforms (World Bank, 2004). The number of basic schools increased by 50 percent from 12,997 in 1980 to 18,374 in 2000 (Work Bank, 2004, p. 31). Polytechnics which used to be administered as second cycle institutions were upgraded to tertiary institutions (Djangmah, 1998).

Djangmah reported that great strides in enrollment were made at all levels of the education system since the inception of the educational reforms. However, many concerns continue to be expressed about education in Ghana. Some of these concerns range from complaints about the quality of teaching and learning which largely relate to inadequacy of educational materials, uneven distribution of trained teachers, many of which refuse to serve in the rural areas. In addition, poor management and supervision have also been blamed for the deficiencies in teaching and learning.

Most of the newly established secondary schools, which were established in the rural areas, remain empty while the older better known secondary schools were oversubscribed. At the tertiary level, many qualified candidates fail to gain admission into colleges or polytechnics. All of these factors and conditions contributed to the general demoralization within the education system, affecting school management, teacher morale, and quality of primary education (World Bank, 2004).
Table 1

Structure of the current Educational System in Ghana

<table>
<thead>
<tr>
<th>Age</th>
<th>Grade</th>
<th>Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>22 and over</td>
<td></td>
<td>Post-graduate</td>
</tr>
<tr>
<td>21</td>
<td></td>
<td>Non-universities</td>
</tr>
<tr>
<td>20</td>
<td></td>
<td>University (Undergraduate degree)</td>
</tr>
<tr>
<td>19</td>
<td></td>
<td>Polytechnic</td>
</tr>
<tr>
<td>18</td>
<td></td>
<td>Teacher training, Nursing training etc.</td>
</tr>
<tr>
<td>17</td>
<td>12 (SSS3)</td>
<td>Senior Secondary School (SSSCE)</td>
</tr>
<tr>
<td>16</td>
<td>11 (SSS2)</td>
<td>Technical and Vocational Training Institutes</td>
</tr>
<tr>
<td>15</td>
<td>10 (SSS1)</td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>9 (JSS3)</td>
<td>Basic (Junior Secondary School)</td>
</tr>
<tr>
<td>13</td>
<td>8 (JSS2)</td>
<td>(Basic Education Certificate Examination)</td>
</tr>
<tr>
<td>12</td>
<td>7 (JSS1)</td>
<td>Mandated</td>
</tr>
<tr>
<td>11</td>
<td>6</td>
<td>Basic (Primary)</td>
</tr>
<tr>
<td>10</td>
<td>5</td>
<td>Mandated</td>
</tr>
<tr>
<td>9</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>3, 4, 5</td>
<td></td>
<td>Pre-primary or Kindergarten</td>
</tr>
</tbody>
</table>

Theoretical Base

It is part of the policy of the current educational reforms to expose all students at the JSS level to pre-vocational and pre-technical subjects in addition to the general education subjects in science and arts. Thus, the JSS concept is intended to have a dual purpose: (1) to prepare students for further secondary education and (2) to prepare terminal JSS graduates for low-level paid employment or self-employment. It was also envisioned that some terminal JSS students would enter the nonformal technical and vocational sector for apprenticeship training (Akyeampong, 2005, p. 166-167). This policy reflects the UNESCO reaffirmation for integrating technical vocational education (TVE) into the national education systems, not only for economic contribution, but also for its cultural, social, and political contributions (UNESCO, 1999, p.37).

According to Baiden (1996), the purpose of technical vocational education in Ghana (at the non-degree level) is to provide young men and women with skills training (in addition to general education) to enable them to fulfill the country’s technical manpower needs including self-employment up to middle level in the field of industry, business, and agriculture (p.93).

When secondary school vocationalization in the United States came under scrutiny in the 1980s, the Committee on Economic Development (CED), comprising influential business executives and educators, debated that employability should not be confused with vocationalism. The CED stated that employability requires problem-solving skills, command of the English language, self-discipline, and the ability to acquire and apply new knowledge (Phelps & Cole,
1988, p.8). In the same vein, vocationalism not only prepares students for employment, but also prepares them for further education.

Asiegbor (1994) studied the relevance contents of the agricultural curriculum to agricultural occupations in Ghana in order to develop a framework for agricultural vocations. Findings showed that the competencies of practitioners of horticulture outweighed competencies contained in the syllabus and textbooks for teaching agriculture in the senior secondary schools. The study recommended that the agriculture syllabus be reviewed to make it commensurate with the level of competencies required for vocational practice. Also in 1994, the Educational Reform Review Committee (ERRC) reviewed the 1987 educational reforms and recommended a reduction of examinable subjects in both core and elective subject areas at the JSS and SSS levels. The ERRC also emphasized the diversification of the school curriculum after reviewing the performance of the first batch of the SSS graduates in 1994. A significant feature of the diversified SSS curriculum is the opportunity it offers students studying different programs to select from a group of general education subjects considered to be foundational in their program. For example, students enrolled in the agriculture program could select one or two elective science subjects, or French. It has been the hope of educational policy makers that diversifying the secondary school curriculum will motivate changes in students’ attitudes towards self-employment and further education, and even ease the transition from school to work (Acheampong, 2005, p.162).

King and Martin (2002) surveyed SSS students in Ghana and their results suggested that diversification of the curriculum does seem to make a difference in the pattern of the students’ career choices. In particular, self-employment and working for private firms were the most preferred among the SSS students. The results also indicated that the patterns of career choice with regards to working in the private sector might be influenced by factors such as location of schools in affluent urban settings or in poor rural settings, parental background, socio-economic factors, and the programs that some senior secondary schools emphasized.

Rivera (2006) analyzed seven country case studies and identified three main challenges confronting post-secondary agricultural education and training systems. These are: creating appropriate incentives for human capital development in agriculture, establishing meaningful institutional linkages with national and global information networks, and putting in place the infrastructures necessary for initial learning and lifelong education. The country analyses also confirm the continuing relevance of three long standing objectives that have guided agricultural education and training systems in Africa: (a) to produce appropriately prepared human resources for public and private employment in agricultural activities; (b) to generate or adapt agricultural knowledge through research; and (c) to pass on this and other relevant knowledge to agricultural producers and service providers through extension and continuing education activities (Rivera, 2006, p.iv).

Senior secondary school designers intended that agriculture, vocational and technical subjects would prepare students not only for the workforce but also for further education. Problems arose when the universities considered some SSS graduates insufficiently prepared for university study. The universities were especially unwilling to admit SSS agriculture graduates because they considered elective science as more appropriate foundation for agriculture programs at the university. A National Education Reform which was organized in 1999 to review the achievements of the 1987 Educational Reform Program drew attention to this problem, but concluded that the problem was a reflection of a “deep gulf in official thinking about the aims and objectives of second cycle education and the deep attachment of the public to academic and
liberal education, perpetrated by the old type secondary schools” (MOE, 2000; cited by Akyeampong, 2005, p.172).

**Purpose and Objectives**
This paper explores the impact that educational reform has had on students’ enrollment and career choice in the agricultural science programs for senior secondary school candidates in Ghana. Specifically, this paper seeks plausible answers to the following questions:
1. Has enrollment in agricultural science increased over the years as a result of implementing the reforms?
2. What proportion of students graduate annually in agricultural science?
3. What are the implications for workforce development?

**Methods and Data Sources**
The study employs explanatory mixed methods (Ivankova, Creswell, & Stick, 2006; Greene, Caracelli, & Graham 1989) to assess the educational reform relative to agricultural science enrollment in the Ghanaian senior secondary schools. The study is in two phases: the first phase uses primary and secondary data to analyze trends in the enrollment of students and final candidates in general science and agricultural science for the period (1999 – 2006). The second phase will complement the first phase. With regards to the first phase, this paper reports findings of trend analysis of final year school candidates for the senior secondary school certificate examinations (SSSCE). These examinations are held annually and are administered by the West African Examinations Council (WAEC) and Ghana Education Service (GES) to select successful candidates for tertiary education (polytechnics, university, vocational institutions, etc).

Data collection was based on the number of candidates that were presented at the final SSSCE for the period 1999-2006. The agricultural science subject areas were general agriculture, crop husbandry and horticulture, animal husbandry, fisheries and forestry. General science subject areas were biology, chemistry, physics and elective mathematics. There are about 503 public and private secondary schools registered by the WAEC for school candidates to take the final SSSCE. Data presented in this paper are those for all final year school candidates who sat for examinations in agriculture and general science programs.

Results from the preliminary data analyses were complemented with qualitative data from key people responsible for developing test materials for the final examinations and marking of examination scripts of the candidates. These were subject officers at the WAEC, Chief examiners for subject areas in the agriculture program, agricultural teachers who are currently commissioned as examiners, and non-teaching examiners. In addition, heads of department for some senior secondary schools offering the agricultural science program were identified to respond to the seven open-ended questions. The questions were: (1) How are the two subjects (forestry and fisheries) different as compared to the other Agricultural subject? (2) Is the syllabus for the fisheries and forestry two broad as compared to the subject? (3) Are the subjects too practical-based to take students out of the classroom for long period? (4) Are there trained teacher for the two subjects? (5) Can any trained Agricultural science teacher teach the two subjects effectively? (6) Is the combination with other subjects in the program unsuitable? (7) In your opinion, what makes it difficult for candidates to choose the subjects? Furthermore, the Chief Examiner’s reports for agriculture subjects in the specified years were reviewed to assist with finding plausible explanation to the problem.
As mentioned above, the second phase will involve collecting empirical data from school administrators and principals, teachers and students, university administrators, and other stakeholders to seek their views on what has been achieved since implementing the educational reforms and the challenges ahead. Part of these data will be presented at the conference.

**Results and Discussion**

*Research Questions 1 and 2: Has enrollment in agricultural science increased over the years as a result of implementing the reforms? What proportion of students graduate annually in agricultural science?*

Results indicate increased enrollments in the agricultural science program over the period 1999-2006 (See Table 2). There was an increase from 6,540 candidates in 1999 to 10,986 candidates in 2006, representing 60 percent increase. However, there were little and in some years no enrollment in fisheries (i.e. 7 candidates in 1999 and 8 candidates in 2006) and forestry (37 candidates in 2003 and 107 candidates in 2006) subjects. No candidates were registered for forestry from 1999 to 2002. The proportion of agricultural science candidates decreased in 1999 (10.8%) compared to 2006 (8.9%). Annually, approximately 10 percent of the total school candidates pursuing agricultural science program graduate. The number that qualifies for tertiary education is not readily available.

**Table 2**

*School Candidates for the Final Senior Secondary School Certificate Examinations (SSSCE) in Agricultural and General Science Programs in Ghana (1999-2006)*

<table>
<thead>
<tr>
<th>Year</th>
<th>Number of SSS candidates</th>
<th>General Agriculture</th>
<th>Animal Husbandry</th>
<th>Crop Husbandry &amp; Horticulture</th>
<th>Fisheries</th>
<th>Forestry</th>
<th>Physics</th>
<th>Chemistry</th>
<th>Biology</th>
<th>Elective Math</th>
</tr>
</thead>
<tbody>
<tr>
<td>2006</td>
<td>122,488</td>
<td>10,986 (8.96)</td>
<td>4,320</td>
<td>7,985</td>
<td>8</td>
<td>107</td>
<td>20,444</td>
<td>24,012</td>
<td>15,996</td>
<td>33,722</td>
</tr>
<tr>
<td>2005</td>
<td>112,559</td>
<td>10,941 (9.72)</td>
<td>3,125</td>
<td>8,948</td>
<td>13</td>
<td>69</td>
<td>20,426</td>
<td>23,753</td>
<td>14,343</td>
<td>31,980</td>
</tr>
<tr>
<td>2004</td>
<td>96,679</td>
<td>9,554 (9.88)</td>
<td>2,789</td>
<td>7,837</td>
<td>7</td>
<td>57</td>
<td>17,703</td>
<td>19,249</td>
<td>10,710</td>
<td>26,318</td>
</tr>
<tr>
<td>2003</td>
<td>81,082</td>
<td>7,912 (9.76)</td>
<td>2,287</td>
<td>6,268</td>
<td>9</td>
<td>37</td>
<td>15,936</td>
<td>17,132</td>
<td>9,748</td>
<td>23,463</td>
</tr>
<tr>
<td>2002</td>
<td>71,741</td>
<td>7,309 (10.19)</td>
<td>2,041</td>
<td>5,775</td>
<td>8</td>
<td>0</td>
<td>14,946</td>
<td>16,036</td>
<td>9,135</td>
<td>22,800</td>
</tr>
<tr>
<td>2001</td>
<td>67,142</td>
<td>7,174 (10.68)</td>
<td>1,803</td>
<td>5,525</td>
<td>4</td>
<td>0</td>
<td>14,244</td>
<td>15,419</td>
<td>8,598</td>
<td>21,126</td>
</tr>
<tr>
<td>2000</td>
<td>63,012</td>
<td>7,430 (11.79)</td>
<td>2,036</td>
<td>5,982</td>
<td>25</td>
<td>0</td>
<td>13,585</td>
<td>15,046</td>
<td>8,242</td>
<td>17,445</td>
</tr>
<tr>
<td>1999</td>
<td>60,262</td>
<td>6,540 (10.85)</td>
<td>11,772</td>
<td>5,538</td>
<td>7</td>
<td>0</td>
<td>12,601</td>
<td>14,122</td>
<td>8,093</td>
<td>15,757</td>
</tr>
</tbody>
</table>

Source: WAEC, Ghana.
All final year students take the Senior Secondary School Certificate Examinations (SSSCE) administered by WAEC in order to pursue tertiary education. Grading is on a descending scale of A through F, with A-E as passing grades. Each students aggregate is calculated by awarding one point for each A, two for each B and so on down to six points for an F. The points awarded for a minimum of three elective subjects plus points for three main core subjects (English, mathematics, integrated science and social studies) are added to calculate the aggregate. Thus, a straight A-student would earn the best possible aggregate of 6 while a student who failed all six subjects would get an aggregate of 36.

Research Question 3: What are the implications for workforce development?
The above question was approached by finding out what the admission requirements for the public universities are in Ghana. This was complemented with the qualitative data obtained from the key informants. To understand the situation, the admission requirements of three public universities were reviewed and compared with other tertiary institutions in the country.

Admissions Requirement for SSS Applicants into Public Universities in Ghana.
Universities admissions have become very competitive especially for agricultural science students. In the College of Agriculture and Natural Resources at the Kwame Nkrumah University of Science and Technology, the following degree programs are offered: a) Bachelor of Science Agriculture and b) Bachelor of Science in Post-Harvest Technology. The programs require passing marks in the three SSSCE core subjects (English, mathematics, and integrated science) plus passing marks in three elective subjects with the following combinations: (I) biology, chemistry and physics or mathematics, or (II) general agriculture, chemistry and physics or mathematics. Other programs are Bachelor of Science in Natural Resource Management, Bachelor of Science in Forest Resource Technology (Sunyani Campus), and Diploma in Natural Resource Management (Sunyani Campus). For these programs applicants must have passing marks in the three SSSCE core subjects plus passes in three of the following elective subjects: chemistry, physics or elective mathematics, biology or general agriculture. It is emphasized in the requirement that applicants with SSSCE mathematics as one of the elective subjects must have strong biology background to be considered for admission.

At the School of Agriculture in the University of Cape Coast, applicants are also expected to submit passing marks in the following core subjects: English, mathematics and science. In addition, applicants must have passing marks in three subjects under general agriculture options one and two. Science candidates, who want to offer Bachelor of Science (Agriculture) degree program must have passing marks in the following elective subjects: physics, chemistry, biology or mathematics.

Admissions to the University of Ghana requires SSS candidates to meet the following requirements: submit passing marks in three subjects English, mathematics and integrated science (for science and engineering applicants) or English, mathematics and social studies (for non-science applicants). In addition, science and engineering candidates would be required to pass core social studies at least at grade E and non-science candidates would also be required to pass integrated science at least at a grade E. Furthermore, passing marks in three elective subjects would be required. For candidates who took more than three elective subjects, the three grades to be used for determining the candidates’ aggregate would be determined by the intended program of study. Thus, to be considered for admission to the School of Agriculture, only general agriculture is considered as an alternative to biology. A minimum aggregate is required in determining eligibility for admission to level 100 programs, and candidates’ aggregate score in
the three core and three elective subjects must not exceed 24. A pass in the SSSCE is understood
to mean a candidate's performance at grades ranging between A and E, and interpreted as follows:
A=1(Excellent); B=2(Very good); C=3(Good); D=4(Credit); E=5(Pass).

Senior Secondary School candidates are admitted to level 100 (first year) of the 4-year
Bachelor's degree program. Students intending to pursue (1) Medicine and dentistry (MB, ChB)
and dental surgery (BDS) would be required to study biological science at level 100. (2) Biology
at level 100 is not a pre-requisite for biology at level 200. (3) Admission at level 100 may be
made to any of the following colleges/ schools/ faculties: agriculture (including home science),
engineering, social studies, nursing, art, science, and business.

From the admission requirements of these public universities, it is evident that general
agriculture is essential for all agricultural science candidates. However, other agricultural science
subjects were not emphasized in the admission requirements. We tend to speculate that perhaps it
might appear too early for SSS students to specialize in these subjects at the senior secondary
school level. In addition, if candidates do not excel to meet the entry grade for admissions, it
would be difficult to be admitted to a program in these institutions. Hence, students who do not
meet the minimum admission requirements would have to seek alternative tertiary institutions.
Even qualifying for admissions does not guarantee entry into these institutions. Departments
have their own criteria for selection and these are strictly adhered to. It must also be emphasized
that all SSS graduates who are admitted into a university enter at level 100 and they must excel
at this level to proceed to the next level to pursue the program of their choice.

Table 3 shows the number of schools that offered agricultural science subjects for the
period 1999-2006. The trend depicts an increase in the number of schools opting for agricultural
science program. General agriculture is a compulsory subject for all schools that register with the
Ghana Education Service and the WAEC. The schools increased from 263 in 1999 to 300 in
2006, representing 14% increase. Similarly, schools offering animal husbandry increased from
81 in 1999 to 137 in 2006, representing 69.1% increase. Forestry and fisheries are the two
subjects that have seen low enrollments during these years and only one to two senior secondary
schools currently offer these subjects.

Table 3

*Secondary schools offering Agricultural and General Science subjects in Ghana (1999-2006)*

<table>
<thead>
<tr>
<th>Year</th>
<th>General Agriculture</th>
<th>Crop Husbandry &amp; Horticulture</th>
<th>Animal Husbandry</th>
<th>Forestry</th>
<th>Fisheries</th>
<th>Physics</th>
<th>Chemistry</th>
<th>Biology</th>
</tr>
</thead>
<tbody>
<tr>
<td>2006</td>
<td>300</td>
<td>249</td>
<td>137</td>
<td>2</td>
<td>1</td>
<td>352</td>
<td>403</td>
<td>304</td>
</tr>
<tr>
<td>2005</td>
<td>295</td>
<td>259</td>
<td>105</td>
<td>2</td>
<td>1</td>
<td>336</td>
<td>397</td>
<td>284</td>
</tr>
<tr>
<td>2004</td>
<td>290</td>
<td>261</td>
<td>95</td>
<td>1</td>
<td>1</td>
<td>318</td>
<td>375</td>
<td>249</td>
</tr>
<tr>
<td>2003</td>
<td>283</td>
<td>252</td>
<td>90</td>
<td>1</td>
<td>1</td>
<td>304</td>
<td>357</td>
<td>240</td>
</tr>
<tr>
<td>2002</td>
<td>281</td>
<td>249</td>
<td>82</td>
<td>-</td>
<td>1</td>
<td>305</td>
<td>352</td>
<td>237</td>
</tr>
<tr>
<td>2001</td>
<td>277</td>
<td>242</td>
<td>73</td>
<td>1</td>
<td>1</td>
<td>296</td>
<td>348</td>
<td>238</td>
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<tr>
<td>2000</td>
<td>272</td>
<td>249</td>
<td>83</td>
<td>1</td>
<td>1</td>
<td>278</td>
<td>336</td>
<td>230</td>
</tr>
<tr>
<td>1999</td>
<td>263</td>
<td>244</td>
<td>81</td>
<td>-</td>
<td>1</td>
<td>263</td>
<td>317</td>
<td>244</td>
</tr>
</tbody>
</table>

Source: WAEC, Ghana
To explore the reasons why there continues to be low enrollments and why schools are not interested in offering these subjects to their students, the seven questions stated in the methods were asked key informants. The themes arising from the analyses of the responses obtained from the informants are summarized. There was overwhelming response to the fact that:

1. Forestry and fisheries compared favorably to the other agricultural science subjects. Reference was made to the Chief Examiners reports and comments from subject officers.
2. The teaching syllabus for forestry and fisheries was within the capabilities of the candidates.
3. The two subjects have equal practical periods like the other agricultural science subjects.
4. There are few teachers trained in fisheries and forestry but other well trained Agricultural science teachers can teach the subject.
5. The combination of fisheries and forestry within the program was unsuitable so candidates did not select it. Reference was made to the elective subject combinations. In these combinations: I. General agriculture is compulsory for all candidates pursuing the agricultural science program. II. One of the following subjects should be chosen: (a) animal husbandry (b) crop husbandry and horticulture (c) fisheries (d) forestry. III. One or two of the following should be chosen: (a) French or music (b) biology (c) physics (d) chemistry (e) mathematics (elective).
6. Apart from the unsuitable subject combinations, there were concerns about candidates expressing the following reasons for not choosing the subjects: (1) lack of job prospects; (2) unavailability of approved text books; and (3) admission to the universities with fisheries or forestry being difficult, because animal husbandry, which majority of schools offers, contains aspect of fisheries and forestry.

**Conclusions, Recommendations, and Educational Importance**

Based on the findings, the following conclusions are made: while the enrollment of SSS school candidates more than doubled (60,262 in 1999 to 122,488 in 2006), the proportion of students enrolled in the agricultural science program declined (10.85% in 1999 to 8.96% in 2006). Annually, approximately 9 percent of SSS school candidates graduate in the agricultural science program. The proportion of students who graduated in agricultural science was above 10 percent between 1999 and 2002, but fell below 10 percent from 2003 to 2006. The enrollment in fisheries and forestry has consistently been very low since the implementation of the reforms. This is likely due to the subject selection criteria approved by the WAEC and GES. Schools that currently offer fisheries and forestry at the secondary level are one (for fisheries) and two (for forestry), respectively. Many senior secondary schools continue to offer crop husbandry and horticulture and animal husbandry, and the enrollments for these subjects have increased progressively. General agriculture and combinations of science elective subjects appear to be subjects that the universities emphasized for admission of SSS candidates.

This paper has revealed that there are some internal lapses which hinder students from selecting agricultural science subjects at the senior secondary school level. It might be too early to suggest modification of the subject combinations until further inquiries are made into what could be done to encourage students to pursue these subjects. A study to determine why schools that offer these subjects continues to do so, could be conducted, and followed up to the universities, teacher training colleges and polytechnics. In addition, a follow-up study to know what proportion of students currently enrolled for tertiary education in the field of agricultural
science may offer a plausible explanation as to what job opportunities exist for SSS agricultural science students.

The workforce development in the forestry and fisheries sectors of the economy may be seriously hampered. The result may call for recruitment strategies to promote and encourage students to pursue courses in fisheries and forestry so as to meet the goals for manpower requirement in these sectors of the economy. Agricultural teachers are presumed to be generalists and should be capable of teaching all subject areas in agriculture. However, agricultural teacher education is becoming limited in producing specialist teachers, and some subject areas in agriculture may be seriously hampered, e.g. forestry and fisheries. It will be necessary to recruit students in the general science program to fill programs in forestry and fisheries at the tertiary education level to meet the workforce demand in these industries. Another strategy will be for teacher training colleges and universities to allow prospective teachers to select forestry and fisheries as minors to meet the graduation requirement.

References


